

A Search for Cometary Dust Analogues in the 10 μ m Spectra of Young Stellar Objects

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Comets formed in relatively cold regions of the solar nebula. Thus, intact interstellar silicate grains could have been incorporated into the growing cometesimals. The Si-O stretching mode vibration in small silicate particles produces a broad spectral feature near 10 μ m. The structure of this band depends on the composition and crystal structure of the silicate particles. If interstellar grains are present in comets, then the 10 μ m spectra of comet dust should resemble that of interstellar dust. A peak at 11.2 μ m attributed to crystalline olivine is seen in the spectrum of Halley and other comets, yet is absent in the interstellar spectra. If the silicate grains were annealed in the solar nebula, then we might expect to see similar spectral signatures in the dust surrounding young stellar objects. But our survey of young stellar objects in the rho Oph cloud and the Taurus region has not revealed any sources with spectra resembling the comets. The search is complicated by the presence of the aromatic hydrocarbon band at 11.25 μ m in some of the sources; even the Trapezium appears to have an aromatic band. Representative spectra will be presented and possible origins of the crystalline silicates in comets will be discussed.